This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

1. (currently amended) A method of rapid identification of characteristics of a transmission media channel ~~characteristics~~, comprising:

generating a training sequence signal;

transmitting the training signal sequence as an input to the channel;

obtaining an output ~~quantity~~ signal of the channel related to the transmitted training signal sequence and an unknown impulse response of the channel;

computing a ~~known quantity~~reference value from the training signal sequence; and

decoupling the training signal sequence from the output signal ~~quantity~~ for computing an estimate of the impulse response of the channel.

2. (currently amended) The method of claim 1, further comprising using the estimate of the impulse response of the channel to remove impairments imposed by the transmission media channel on received signals.

3. (currently amended) The method of claim 1, wherein the computing the estimate of the impulse response of the channel comprises a convergence technique.

4. (currently amended) The method of claim 1, wherein the training signal sequence comprises a known training signal sequence.

5. (currently amended) The method of claim 1, wherein the computing the estimated impulse response of the channel comprises computing an initial estimate of the impulse response.

6. (currently amended) The method of claim 1, further comprising fine-tuning the estimated impulse response using ~~standard~~ convergence techniques.

7. (currently amended) The method of claim 1, wherein the computing the estimated impulse response comprises operating the ~~known quantity~~reference value on the output ~~quantity~~signal.

8. (currently amended) The method of claim 1, wherein the ~~known quantity~~reference value is computed off-line.

9. (currently amended) The method of claim 1, wherein the reference value~~known quantity~~ comprises a matrix $M = (\bar{X}X)^{-1}\bar{X}$, where $\bar{X}$ is the training signal sequence in matrix form, and X is the Hermitian of X.

10. (original) The method of claim 1, wherein the computing the estimate of the impulse response of the channel is hardware implemented.

11. (original) The method of claim 1, wherein the computing the estimate of the impulse response of the channel is software implemented.

12. (currently amended) The method of claim 1, further comprising using the estimate of the impulse response of the channel for removing echoes from ~~received~~ signals received from the channel.

13. (original) The method of claim 1, further comprising using the estimate of the impulse response of the channel for setting the coefficients of a filter.

14. (original) The method of claim 1, further comprising using the estimate of the impulse response of the channel for setting the coefficients of an echo canceller.

15. (original) The method of claim 1, further comprising using the estimate of the impulse response of the channel for setting the coefficients of an equalizer.

16. (currently amended) A method of rapid identification of characteristics of a transmission media channel ~~characteristics~~, comprising:

generating a training signal sequence;

transmitting the training signal sequence over a transmission media channel to generate an observed or measured output signal;

~~convolving the training sequence with an unknown impulse response representation of the transmission media channel to form a computed output signal of the channel;~~

~~minimizing a difference between an observed or measured output signal of the channel and the computed output signal of the channel~~;

using ~~the~~ a minimized difference value between the observed or measured output signal and a signal value representation of convolution of the training signal sequence and the unknown impulse response of the channel, together with the training signal sequence~~,~~ and the observed or measured output signal for computing an estimated impulse response of the channel.

17. (currently amended) The method of claim 16, wherein the using the minimized difference, the training signal sequence, and the observed or measured output signal for computing ~~an~~ the estimated impulse response of the channel comprises using a ~~known quantity~~reference value related to the training signal sequence that can be expressed as a matrix $M = (\tilde{X}X)^{-1}\tilde{X}$, where X is the training signal sequence in matrix form, and $\tilde{X}$ is the Hermitian of X.

18. (original) The method of claim 17, further comprising computing M off-line from communications with the transmission media channel.

19. (currently amended) The method of claim 16, wherein the using the minimized difference, the training signal sequence, and the observed or measured output signal to compute

the estimated impulse response of the channel comprises decoupling the training signal sequence from the output signal for computing the estimated impulse response of the channel.

20. (currently amended) The method of claim 16, further comprising using the estimated impulse response of the channel to remove impairments imposed by the transmission media channel on received signals.

21. (currently amended) The method of claim 16, further comprising fine-tuning the estimated impulse response of the channel using ~~standard~~ convergence techniques.

22. (currently amended) The method of claim 16, wherein the computing the estimated impulse response of the channel comprises a convergence technique.

23. (original) The method of claim 16, further comprising using the estimated impulse response of the channel for setting the coefficients of a filter.

24. (original) The method of claim 16, further comprising using the estimated impulse response of the channel for setting the coefficients of an echo canceller.

25. (original) The method of claim 16, further comprising using the estimated impulse response of the channel for setting the coefficients of an equalizer.

26. (currently amended) A system for rapid identification of characteristics of a transmission media channel ~~characteristics~~, comprising:

a transmission media channel;

a processor coupled to the transmission media channel, said processor adapted to execute code to:

generate a training signal sequence;

transmit the training signal sequence as an input to the channel;

obtain an output ~~quantity~~ signal of the channel related to the transmitted training signal sequence and an unknown impulse response of the channel;

compute a ~~known quantity~~reference value from the training sequence; and

decouple the training signal sequence from the output ~~quantity~~ signal to compute an estimate of the impulse response of the channel.

27. (original) The system of claim 26, wherein the processor comprises a DSP.

28. (original) The system of claim 26, wherein the processor comprises a CPU of a computer.

29. (original) The system of claim 26, further comprising a modem coupling the processor to the transmission media channel.

30. (original) The system of claim 26, wherein the processor forms part of a communications system.

31. (original) The system of claim 26, wherein processor forms part of a modem.

32. (original) The system of claim 26, further comprising a hybrid coupling the processor to the transmission media channel.

33. (currently amended) The system of claim 26, wherein the processor is adapted to execute code to compute a matrix $M = (\tilde{X}X)^{-1}\,\tilde{X}$ representing the reference value, off-line from the transmission media channel, and wherein X is the training signal sequence in matrix form, and $\tilde{X}$ is the Hermitian of X.

34. (original) The system of claim 26, further comprising a hybrid coupling the processor to the transmission media channel.

35. (currently amended) The system of claim 26, wherein the processor is adapted to use the estimate of the impulse response of the channel to remove impairments imposed by the transmission media channel on received signals.

36. (currently amended) The system of claim 26, further comprising a filter adapted to remove channel impairments from ~~received~~ signals received from the channel using the estimate of the impulse response of the channel.

37. (currently amended) The system of claim ~~26~~36, wherein the filter comprises an echo canceller for removing echo signals.

38. (currently amended) The system of claim ~~26~~36, wherein the filter comprises an equalizer whose output is equalized for gain and phase.

39. (currently amended) A system for rapid identification of characteristics of a transmission media channel ~~characteristics~~, comprising:

a processor for executing code for generating a training signal sequence, the training signal sequence transmitted as an input to the channel;

a communications system coupling the processor to the channel, the processor executing the code to:

obtain an observed or measured output ~~quantity~~signal of the channel related to the transmitted training signal sequence and an unknown impulse response of the channel,

compute a ~~known quantity~~reference value from the training sequence,

decouple the training signal sequence from the output ~~quantity~~signal, and

compute an estimate of the impulse response of the channel; and

a disk storage medium for providing the code to the processor.

40. (original) The system of claim 39, wherein the processor comprises a DSP.

41. (original) The system of claim 39, wherein the processor comprises a CPU of a computer.

42. (original) The system of claim 39, further comprising a modem coupling the processor to the transmission media channel.

43. (original) The system of claim 39, wherein the processor forms part of a communications system.

44. (original) The system of claim 39, wherein processor forms part of a modem.

45. (original) The system of claim 39, further comprising a hybrid coupling the processor to the transmission media channel.

46. (currently amended) The system of claim 39, wherein the processor executes code to compute a matrix $M = (\vec{X}\Omega X)^{-1}\overline{X}$, off-line from the transmission media channel, and wherein X is the training sequence in matrix form, and X is the Hermitian of $\overline{X}$, and wherein M represents the reference value.

47. (currently amended) The method of claim 39, wherein the estimate of the impulse response of the channel is computed in a hardware implementation.

48. (currently amended) The method of claim 39, wherein the estimate of the impulse response of the channel is computed in a software implementation.

49. (currently amended) The system of claim 39, wherein the processor is adapted to use the estimate of the impulse response of the channel to remove impairments imposed by the transmission media channel on received signals.

50. (currently amended) The system of claim 39, further comprising a filter adapted to remove channel impairments from ~~received~~ signals received from the channel using the estimate of the impulse response of the channel.

51. (currently amended) The system of claim ~~39~~50, wherein the filter comprises an echo canceller for removing echo signals.

52. (currently amended) The system of claim ~~39~~50, wherein the filter comprises an equalizer whose output is equalized for gain and phase.